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THE OHIO STATE UNIVERSITY
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Educational Research Bulletin

A STUDY OF THE TECHNICAL AND SEMI-TECHNICAL VOCABULARY OF ARITHMETIC

S. S. Brooks
Ohio State University

Probably most teachers in the upper elementary grades and in high school who have undertaken even a superficial analysis of pupil difficulties in connection with their school work will admit that the major part of those difficulties is engendered by inability to comprehend the subject-matter in their textbooks. This is especially true in mathematics and science including geography and physiology. The material upon which their reading drill is usually based in the process of learning to read in the lower grades of the elementary school is purely literary in character. It does not equip them gradually with a reading vocabulary that enables them to enter with some degree of pleasure and understanding into the study of the more technical subjects in the higher grades.

Reading is the fundamental tool subject, the key with which the child must unlock the various doors to the world's storehouse of recorded knowledge, most of which is recorded elsewhere than in narrative literature. Wherein then is the logic of the method that limits the child's school reading material largely to narrative literary material during the period when he is "learning to read" and makes little effort to supply him with the technical reading vocabulary that he will need in all his later school work.

One cannot read a paragraph understandingly unless each word represents a clear-cut idea in the reader's own mind. Each of the sciences has its special vocabulary by which are expressed the basic concepts of the science. Most of them are seldom, and many are never, met with in general reading, but they are the principal or key-words in reading the subject-matter of any science. It is essential for the student to know the meanings of such words if he is to gain accurate information from his textbook.

Although many vocabulary studies have been made, few deal with the technical vocabularies of special subjects. Of such vocabulary studies, those made by S. L. and L. C. Pressey[1] are most comprehensive and best known. I quote them as follows:

> As soon as the pupil begins such subjects as arithmetic, geography, science, history, etc., he begins to encounter special or technical vocabularies. And it soon becomes obvious that the "ability to read" acquired in the lower grades does not guarantee comprehension of arithmetic problems or in texts of geography, science, or history. It is a chronic complaint of the teachers of the upper grades that pupils cannot read their problems and texts, in spite of their supposed mastery of "reading" in the lower grades.
>
> One important cause of the pupil's failure to make sense of his textbook is, of course, his failure

[1] Pressey, S. L., and Pressey, L. C. "The Determination of the Technical Vocabulary of the School Subjects," *School and Society*, 20:91-96, July, 1924.

to recognize certain of the important technical words appearing therein.

It seems reasonable to suppose that pupils' difficulties with technical vocabularies might be ameliorated by the use of a wider range of non-literary supplementary reading material in the elementary grades that would introduce them gradually to many of the important technical words they will meet later in pursuing their studies in the content subjects.

A great deal of suitable material is now available for the purpose, but even so the greater part of the burden of teaching technical vocabularies must fall upon the teacher of each special subject. In order to do this thoroughly she must not only keenly realize the need for such instruction, but must also know what words her pupils can use, what ones need to be taught, and how to teach them in the most efficient manner.

The first technical vocabulary which the child meets is that of arithmetic. Many teachers apparently do not realize the extent to which lack of proper word knowledge handicaps most children in connection with their arithmetic problems. Some interesting reports of investigations into children's arithmetic vocabulary difficulties are contained in an earlier issue of this Bulletin.[1] Below are some quotations from this issue which is devoted to studies of Remedial Instruction in Arithmetic:

"Pupils often fail to get the meaning of a problem because of word difficulties, ... inability to interpret the meaning of the words used. Such words as *average, area, rate, ratio, product*, were some of the words for which we found very indefinite meanings in the minds of pupils." (p. 271)

"Vocabulary difficulties . . . . are real and are always present, they hinder the pupils in their understanding of the full import of the problems to be solved. The words and phrases used are often strictly mathematical and bear a sense peculiar to the subject. When pupils fail to interpret them correctly, they become a source of difficulty.

The language of problems should be made as clear and simple as possible. If unfamiliar and technical terms must be used, they should be thoroughly explained to the pupils before the solution of the problems is attempted. Further, not only words and phrases must be explained, but the various signs, symbols, and abbreviations which are also a part of the language of arithmetic problems should be given their due share in the explanation." (p. 280)

The present study is the result of a strongly felt need engendered in the writer by several years' experience in classroom supervision; he sees a need for more definite and complete knowledge of the special vocabularies of certain school subjects that can be used as a basis for remedial instruction.

MATERIALS USED

This study is based on the vocabulary content of five complete sets of representative arithmetic textbooks, each set covering the work for grades III to VIII as follows:

1. Drushel, J. A., Noonan, M. E., Withers, J. W. *Arithmetical Essentials* (Lyons and Carnahan).
2. Marsh, Harry B., Van Sickle, J. H. *The Pilot Arithmetics* (Newson and Company).
3. Hamilton, Samuel. *Hamilton's Essentials of Arithmetic* (American Book Company).
4. Wentworth, George, Smith, David Eugene. *School Arithmetics* (Ginn & Company).
5. Campbell, W. A., Hughes, T. H. *Arithmetic by Grades* (Hinds, Hayden & Eldredge).

WORDS INCLUDED

In any formulation of a special vocabulary one of the first difficulties is the problem of deciding definitely what words shall be included and what words omitted. Because no two persons would probably agree on the answer, any decision must be arbitrary and subjective in character, but why should this fact preclude the making of vocabulary studies that may be exceedingly useful to

[1] October 15, 1924.

teachers and textbook writers? If such studies are not made until they can be done on a purely objective basis, they may never appear.

For the purposes of this investigation it was decided to include all words (with exceptions noted below) pertaining to:

1. Numbers
2. Operations with numbers
3. Value
4. Size
5. Quantity
6. Degree
7. Position (in space or time)
8. Shape
9. Money
10. Measurement
11. Commercial terms
12. Directive terms

WORDS OMITTED

For practical consideration all numerals and names of fractions above tenths are omitted. The only ordinals included are first, second, third, and fifth, as the others are self-explanatory. Only irregular plurals and, with a very few exceptions, only the present indicative singular form of verbs are included. The remaining plurals and verb forms would enlarge the list of words out of proportion to benefits obtained.

The selection of all words that conform to the above criteria will, of course, add many words that are not strictly technical; it is probably stretching a point to call some of them even semi-technical. On the other hand the list is far from being a general vocabulary; so we shall let the title stand until someone suggests a better one.

An analysis of the third-grade technical and semi-technical vocabulary of arithmetic in the five textbooks mentioned gave a total of 429 words. It was decided arbitrarily to omit all words occurring less than five times in all or in less than three of the five books. This elimination left the following list which contains 237 words:

	Frequency	Number of Books
about	7	3
above	32	4
add	382	5
addend	5	2
addition	51	5
after	45	5
again	10	4
all	166	5
always	5	3
A. M.	14	3
amount	33	5
amount to	9	3
another	65	5
answer (n)	120	5
apiece	18	4
bank	49	5
barrel	8	3
before	27	4
below	51	4
between	29	5
bill (goods)	30	4
bill ($)	27	4
both	61	5
bottom	16	4
bought	199	5
bu.	13	4
bushel	53	5
buy	306	5
carry	19	4
cent	586	5
change ($)	88	5
change (v.)	6	3
charge	12	3
circle	37	4
coin	6	3
column	109	5
compare	14	3
complete (v.)	20	4
contain	53	5
corner	21	4
correct (a.)	44	5
correctly	14	3
cost (n.)	153	5
cost (v.)	342	5
count	180	5
da.	13	3
day	239	5
dealer	27	2
decimal point	25	4
difference	40	5
dime	103	5
distance	10	3
divide (÷)	158	5
divide (sep.)	66	5
division	29	5
divisor	15	3
dollar	177	5
down	16	3
doz.	46	3
dozen	113	5
during	7	4
each	675	5
eighth (fr.)	10	3
enough	17	3
equal (a.)	49	4
equal (v.)	27	4
equally	72	4
every	33	4
example	60	5
exercise	128	3
expenses	8	4
fact	10	3
far	17	5
fare	11	3
feet	123	5
fifth (fr.)	11	3
figure (n.)	106	5
figure (diag.)	19	3
first	114	5
following	125	5
foot	73	5
fourth (fr.)	62	5
front	8	3
ft.	199	5
gain (v.)	6	2
gal.	63	5
gallon	89	5
goods	7	3
group (n.)	122	4
half	135	5
halves	21	5
highest	5	2
hold	31	5
hour	133	5
hr.	19	3
in.	192	5
inch	278	5
large	24	3
larger	11	4
largest	5	3
last	42	4
lb.	109	5
left	160	5
length	39	4
less	54	5
line	160	5
little	21	5
long	239	5
long (time)	35	5
longer	6	4
lower	13	3
make (gain)	15	3
make (equal)	34	4
many	1,398	5
measure (n.)	45	5
measure (v.)	66	5
mile	34	5
min.	13	3
minuend	17	3
minute	134	5
missing	42	4
mistake	7	2
money	134	5
month	106	5
more	167	5
much	685	5
multiplicand	11	4
multiplication	45	4
multiplier	25	4
multiply	209	5
next	43	5
nickel	55	5
now	25	4
number (n.)	748	5
ounce	47	4
outside	7	2
over (more)	21	5
owe	13	3
oz.	41	4
paid	64	5

	Frequency	Number of Books		Frequency	Number of Books
pair	39	5	sold	120	5
parcel	5	2	solve	7	3
part	101	5	some	75	4
pay	166	5	space (n.)	27	4
peck	71	4	sq.	72	5
penny	15	2	square (a.)	11	4
pint	127	5	square (n.)	76	5
pk.	45	4	square foot	34	3
place (n.)	64	4	square inch	54	3
place (v.)	8	3	square yard	11	5
P. M.	12	3	state	47	3
postage	17	3	subtract	123	5
pound	196	5	subtraction	36	5
price	60	5	subtrahend	13	3
problem	90	5	sum	147	5
product	118	5	table	80	4
prove	39	3	tall	17	4
pt.	56	5	tenth (fr.)	10	3
purchase (n.)	11	5	test (n.)	8	5
qt.	134	5	test (v.)	15	3
quart	236	5	then	10	3
quarter (fr.)	42	5	third (fr.)	41	5
quarter ($)	24	4	third (ord.)	51	5
quotient	60	5	time (n.)	117	5
remainder	86	5	times	117	5
rest	10	3	top	28	3
result	23	3	twice	13	5
right	59	5	under	55	5
Roman	20	5	unit	80	3
row	92	5	up	14	5
rule (ruler)	28	4	upper	12	3
ruler	18	4	value (n.)	33	4
sale	12	5	week	139	5
scale (1 in. = 1 mi.)	6	3	weigh	47	5
second (ord.)	50	5	weight	27	4
			whole (a.)	19	4
sell	66	5	wide	100	5
separate (v.)	9	4	width	16	4
share (n.)	15	3	wk.	34	3
share (v.)	19	2	worth	36	5
short	8	3			
side	34	3	yard	134	5
			yardstick	10	4
sign (n.)	23	4	yd.	118	5
sixth (fr.)	16	3	year	91	5
size	11	3	yr.	7	3
small	21	4			
smaller	5	4	zero	16	5

Of the original 429 words, 60 occur once in all books, 149 occur five times, and 43 occur more than five times but in only one or two books. All told there are 117 words occurring in only one book; 76, in two books; 70, in three books; 56, in four books; and only 110 that occur in all five books.

Of the 149 words occurring less than five times 102, or 68 percent, are used in but one of the five texts examined. Another 40 words, or 27 percent, are not found in more than two books. This leaves 7 words, or 5 percent, of the words occurring less than five times that are found in more than two books. Seven of these are found in three books and one in four.

Typical of the words occurring but once in the study are the following:

combination	insurance
deposit	oblong
diagram	opposite
distribute	partial
divisible	partnerships
enclose	quire
estimate	reduce
express (verb)	represent
fund	separately
indicate	treasury
include	triangle

Each book contains from 30 to 70 such words. In looking these words over, one feels that many, if not all of them, are out of place in an arithmetic text intended for use in the third grade. The attention of authors and publishers of texts should be called to this point, for surely if such words are used but once in five books, or even in one book, they might be avoided altogether with worthwhile simplification of subject-matter.

In order that the results of this analysis may be put to practical use by the teacher in finding out what words her pupils already know and which ones need to be taught, the entire list has been put into a check list in a multiple-choice-test form. This list is too long to be printed here in its entirety, but a sample is given below:

A DIAGNOSTIC CHECK LIST

TECHNICAL VOCABULARY OF ARITHMETIC

Grade III

1. A word meaning almost or nearly:

1	2	3	4
about	quite	several	twice

2. To sum up, to unite in one sum or quantity:

1	2	3	4
construct	cancel	balance	add

3. Another time, once more:

1	2	3	4
whence	against	agent	again

4. Earlier, sooner, in front of:

1	2	3	4
entire	before	beneath	above

SIMPLE INVESTIGATIONS OF THE TEXTBOOKS OF TODAY AND YESTERDAY

LUELLA COLE PRESSEY
Ohio State University

DURING the summer of 1925 one of the author's classes[1] worked out some simple investigations of textbooks. Each student worked on a different problem, but the studies were similar because the texts selected represented publications over a number of years. No particular effort was made to find the one or two most widely used books during any period, as this study was only a preliminary skirmishing to determine methods of arranging a historical study of textbooks. It is with the hope that others may find these simple methods suggestive that the results are published.

How much space is devoted in histories to characterizing important individuals?—As her criterion of importance Miss Adams selected those individuals whose names appeared anywhere in the histories in a paragraph heading. She counted the number of lines given to describing these "important" individuals in three texts,[2] published respectively in 1897, 1908, and 1924. The results appear in Table I. The most recent book shows a decrease in the number of individuals mentioned prominently, but none of these texts endeavors to acquaint children with the character and individuality of our national heroes.

How many dates per page do histories usually have?—Five histories of the United States[3] were selected by Miss Ferguson for this study. The dates on every tenth page were counted and the total number averaged for each book. The summaries appear below:

Date	Number of Dates per Page
1897	3.2
1897	4.0
1911	4.2
1918	2.0
1922	3.6

The main significance of these figures lies, not in the historical comparison, but in the perfectly obvious fact that there are too many dates in every one of the histories studied. When one considers that there are three hundred and fifty to four hundred pages or more in these books, one realizes that the child is confronted with from eight hundred to sixteen hundred dates. Perhaps one reason that children develop such very slight concepts of time, in a historical sense, is that the dates are so frequent as to lose all significance.

What types of problems are on the increase in arithmetic texts?—For this problem Mr. Griffith selected four arithmetic texts[4] published respectively in 1861, 1897, 1915, and 1924. He examined the problems on every fifth page and tabulated the number of problems under four headings: (1) those involving the making of change, (2) those involving compound interest, (3) those involving the measurement of time from one date to another aside from compound interest, (4) those involving

[1] The students who made the actual analyses were: Mary Adams, Ray Griffith, Jessie Ferguson, Margaret Allen, Ray Wagner, Helen Ruhlen, Vera Dickinson, Arenius Evans, and C. W. Pieters.

[2] Morris, *History of the United States*, 1897.
Mace, *History of the United States*, 1908.
Beard and Bagley, *History of the American People*, 1924.

[3] Beard and Bagley, *History of the United States*, 1918.
Grady, *History of the United States*, 1922.
Muzzy, *American History*, 1911.
Montgomery, *Students' American History*, 1897.
Morris, *History of the United States*, 1897.

[4] Greenleaf, *Arithmetic*, 1861.
White, *New Complete Arithmetic*, 1897.
Wentworth-Smith, *Essentials of Arithmetic* (Intermediate), 1915.
Anderson, *Arithmetic* (Book II), 1924.

a measurement of floor space. The results are summarized in Table II.

The first and last types of problems represent processes of real social value at present. Since compound interest and the mere reckoning of time elapsed between certain dates were selected as representative of types of skill now largely useless from a social point of view, the results came out about as one might hope.

What kinds of maps and other illustrations appear in geographies?—In answering this question Miss Allen used three geographies.[1] She first counted the number of maps of various types, the number of illustrations, charts, and tables, and the number of locations appearing on each full-page political map. The entire geography was considered in each case. The evidence given by Table III indicates that political maps are becoming fewer, while relief and economic maps are growing in number. Illustrations are conspicuously increasing, and the use of charts and tables is developing. The number of locations on each is fortunately lessening. Any child might well be completely bewildered by a map presenting from 137 to 426 different towns, cities, countries, mountains, and lakes, as is the case in the earliest book considered.

TABLE I. COMPARISON OF THREE HISTORY TEXTS

Year of Publication	Number of Individuals	Average Number of Lines per Character
(1)	(2)	(3)
1897	146	2.1
1908	142	.8
1924	92	.93

[1] Harper, *School Geography*, 1887.
Tarr and McMurray, *School Geography*, 1910.
Niver, *Complete Geography*, 1922.

Is the vocabulary of readers becoming easier?—The method used in this study was so elaborate that only two readers[2] were considered; conclusions are, therefore, being drawn on insufficient data. Mr. Wagner considered the words appearing in the top line of every tenth page of the earlier reader and listed the *different* ones. He found 1,543 words in all, of which 552 were different and 991 were duplicates. A similar count of 1,543 words in the 1923 reader yielded only 294 different words, with 1,249

TABLE II. NUMBER OF OCCURRENCES OF EACH TYPE OF PROBLEM

	Type 1	Type 2	Type 3	Type 4
(1)	(2)	(3)	(4)	(5)
1861	1	46	42	5
1897	5	5	63	2
1915	41	0	1	0
1924	101	0	5	12

NOTE.—Type 1. Problems which involve making change.
Type 2. Problems which involve compound interest.
Type 3. Problems which involve the measurement of time.
Type 4. Problems which involve the measurement of floor space.

TABLE III. NUMBER OF MAPS, ILLUSTRATIONS, CHARTS, AND TABLES IN THREE GEOGRAPHY TEXTS

Kind	Date of Publication		
	1887	1910	1922
(1)	(2)	(3)	(4)
Political maps	43	19	33
Relief maps	2	12	33
Economic maps	0	25	21
Illustrations	189	233	402
Charts and tables	38	69	47
Locations per full page political map	223	151	124

[2] Appleton *Fourth Grade Reader*, 1878.
Baker-Thorndike, *Fourth Reader*, 1923.

duplicates. Evidently the latter reader used fewer words and repeated them oftener. The different words were looked up in the Thorndike *Word Book*, and the index number recorded. A tabulation of these index numbers showed that in each book approximately 6 percent of the words were outside of Thorndike's list. A weighted median, reckoned by double-weighting the words outside the list, was found to be about

study were published at different dates between 1878 and 1925. The content of each reader was analyzed to find the amount of space given to different types of writing and to various types of subject-matter. The results are presented in Table IV.

This table indicates some interesting changes in the choice of subject-matter. Poetry has decreased from 26.6 percent to 5.2 percent. A qualitative analysis

TABLE IV. SUMMARY OF CONTENTS BY PERCENTS

CONTENTS*	NAME OF READER AND DATE OF PUBLICATION			
	Appleton 1878	Baldwin 1897	Howe 1909	Field 1925
(1)	(2)	(3)	(4)	(5)
Preface	0.4	0.9	0.7	0.5
Tables of contents	1.2	0.7	0.8	0.5
Silent reading questions	.....	.....	.....	9.0
Notes and questions	17.7	.....	.....	.....
Notes	.....	1.4	1.5	.....
Suggestions for study	.....	.....	.....	1.9
Suggestions for further readings	.....	.....	.....	3.1
Vocabulary (pronunciation)	4.8	6.2	2.4	6.0
Poetry	26.6	16.1	24.1	5.2
Fiction	33.0	37.9	52.4	35.5
Biography	4.4	2.1	4.5	5.5
Essays (informational)	8.0	6.9	4.1	1.1
Drama	0.6	.....	.....	2.2
History	.....	18.2	.....	11.4
Letters	0.3	.....	1.0	2.6

* There were 6 pictures in the Appleton reader; 77, in the Baldwin; 23, in the Howe; and 47, in the Field.

halfway through the second thousand for the earlier book, but within the first thousand for the later book; this indicates that the words are simpler in the Baker-Thorndike reader since over half of them are to be found in the most common thousand. All in all this word count agrees very well with expectations.

What changes have taken place in the content of fourth-grade readers?—The four texts[1] used by Miss Ruhlen in this

shows a modern tendency to choose short poems rather than long. Fiction remains almost uniformly at 35 percent, only the Howe reader exceeding 50 percent. The amount of biography is small and differs in presentation rather than in quantity. Contrary to what might be expected, the purely informational type of writing, including scientific facts, has decreased from 8 percent to 1 percent. Biblical stories have vanished. Drama has little place in the average fourth-grade reader. Field and Baldwin consider patriotic literature important, for both reserve a

[1] Appleton, *Fourth Reader*, 1878.
Baldwin, *Fourth Reader*, 1897.
Howe, *Fourth Reader*, 1909.
Field, *Fourth Reader*, 1925.

large space for American history and Baldwin includes national songs. Personal letters are increasing slightly in favor.

A comparison of the authors from whose writings selections are taken indicates a change in aim. Appleton gives ten pages to the fiction of Louisa Alcott; Cargrove, Cooper, Swift, Scott, and De Foe are also favorites. Longfellow, Wordsworth, Scott, and Bryant contribute a high percent of the poetry. In Baldwin, Longfellow still stands first, and George Morris and Thomas Westwood, second. Howe's reader gives Whittier nine pages; Longfellow, five; Tennyson, Shakespeare, and Emerson, about five; and selections from De Foe, Hawthorne, and Whittier are also included. Field includes none of the older poets but such men as Frost, Masefield, Lindsay, and Riley; the fiction also is modern.

These facts show that the aim of the reader is changing from the old idea of teaching declamation and morality to the new idea of teaching comprehension and appreciation. In accomplishing this there has been a gradual improvement in the sincerity of the subject-matter. Gray's "Elegy in a Country Churchyard" is no longer placed in readers for the good of the child's soul. An author's name does not adequately recommend his writings.

The modern readers attempt not only to teach rapid comprehension of immediate material but to direct future reading. The stories are artistically presented and illustrated. They teach even while they entertain.

What changes may be found in the number and difficulty of words in spelling books?—Two students worked upon this problem, but since both pursued the same method using different texts[1] the results may be considered in the same section. They listed every tenth word in each book and found the index number for each of these words in the Thorndike *Word Book*. The spellers were then compared as to the distributions of the words among the most common ten thousand in the language. Table V shows for two of the books the total number of words per grade and the percent of words by grade (1) not included at all in Thorndike's list, (2) occurring in the first five thousand, and (3) occurring in the second five thousand.

TABLE V. THE TOTAL NUMBER OF WORDS IN TWO BOOKS AND PERCENTS IN THE THORNDIKE LISTS

	Grade VI		Grade VII		Grade VIII	
	1907	1925	1907	1925	1907	1925
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total number of words in book	1,380	578	1,680	444	1,960	571
Percent not in Thorndike lists	20	10	43	7	73	15
Percent in the first 5,000 of Thorndike list	44	15	46	23	21	33
Percent in second 5,000 of Thorndike list	73	15	21	33	6	52

The earlier speller contained many more words and the words were far more

[1] Sheldon, *Word Studies*, 1886.
New Era Word Book, Part II, 1907.
Jones, *Complete Course in Spelling*, 1925.
The New Merrill Speller, 1925.

difficult. In grade VIII, 73 percent of the words were not included in the most frequently used ten thousand words listed by Thorndike.

Table VI gives a similar study comparing the oldest and most recent spellers throughout the entire elementary school, from the second through the eighth grades. Since the earlier speller was not divided into grade sections, results as a whole must be considered. The method was identical with that described above. In this particular

TABLE VI. COMPARISON OF THE OLDEST AND MOST RECENT SPELLERS

	1886	1923
Total number of words.....	4,036	5,059
Percent not in Thorndike lists..	32	5
Percent in first five lists of Thorndike, *Word Book*.....	67	23
Percent in last five lists of Thorndike, *Word Book*.....	10	72

instance the newer book shows a somewhat larger number of words, but this is probably due, in part at least, to the appearance of, for instance, "lady" and "ladies" or of "go" and "going" as separate words. The findings concerning the difficulty of the words is practically the same as for the preceding study.

SUMMARY

Obviously one cannot rely too much on comparisons between the texts of today and yesterday when only a text here and there is examined. It remains for future students to add to and verify these results. The author feels, however, that simple objective comparisons of one textbook with others, whether of different periods or of the same period, are decidedly interesting and profitable.

A building survey of the Troy city schools is being conducted by the Bureau of Educational Research, Ohio State University. A survey staff from the College of Education, under the direction of P. R. Stevenson, spent several days in Troy during the last week of April. At this time a careful study was made of the population trends, the present school plant, the financial situation, and future needs of the schools.

B. R. Duckworth, of Greenfield, reports that more than two-thirds of the high-school principals of Ohio have heartily responded to his inquiry relative to his study of "The Business Management of Extra-Curricular Activities." These school executives have not only furnished a mass of pertinent facts, but have included with their data many interesting forms which they have found to be serviceable in the direction and control of these activities. This study, which is being made under the direction of the Department of School Administration, Ohio State University, will be completed this summer.

DATES for the Seventh Ohio State Educational Conference have recently been announced by the Executive Committee as April 7, 8, and 9, 1927. The keynote which will be used to guide the program-makers for this seventh annual meeting has also been selected. The meetings, general and sectional alike, will all be focused upon the slogan, "Expertness in Teaching."

The executive committee for the 1927 meeting hopes to be able to release at an early date the names of certain speakers of national reputation. Members of this committee are: Dean George F. Arps, *Chairman*, P. R. Stevenson, *Secretary*, B. H. Bode, B. R. Buckingham, F. N. Maxfield, E. W. Pahlow, O. G. Brim, C. C. McCracken, S. Renshaw, and H. G. Hullfish.

It is interesting to note that this committee was formed and the above matters decided upon within three weeks after the close of the Sixth Annual Conference held this April.

Ohio State University

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B. R. BUCKINGHAM . . . . *Editor*
JOSEPHINE MACLATCHY . *Assistant Editor*

Address all communications to the
BUREAU OF EDUCATIONAL RESEARCH
Ohio State University, Columbus, Ohio

THE ATTITUDE TOWARD PREVIOUS INSTRUCTION

A CERTAIN college professor of history was lately heard to complain that the students who entered his classes had learned no history of any consequence in high school. He had repeatedly tested these students, and their knowledge was so pitifully inadequate that the only thing he could do was to begin all over again. "Really, you couldn't count on anything," said he, "not even the simplest facts. For example, ..."

So American history was taught as if nobody had ever studied it before. Yet the usual public-school course requires the teaching of American history on a biographical basis in the fifth and sixth grades. The ground is again covered in the eighth grade and once more in the high school. That this previous instruction should leave no trace is a psychological absurdity; that a college course should ignore it is pedagogical malpractice.

Such malpractice is by no means confined to the college although it is present there in a peculiarly aggravated, as well as aggravating, form. It is found in many high-school classes and in not a few grades of the elementary school; it is based largely on an exaggerated sense of what the student *does not* know.

Let the point of view be shifted and an astonishing transformation takes place. Let attention be focused upon what the student *does* know, and his knowledge turns out to be considerable—even his knowledge of things he is not expected to know. It will occasionally be found that a student can already pass the course he is about to take. It will often be found that many students can give a good account of themselves on some parts of the course. It will generally be found that, unless the course is really an introductory course, all the pupils know something about it. It is a teacher's duty to take an inventory of the knowledge possessed by the students and to adapt his teaching accordingly. To dismiss the matter with a sweeping gesture and to declare that nobody knows anything is both intolerant and untrue.

Even if the results of tests were unsatisfactory, it might still be true that the students in question were ready to go forward. For example, a student may make a poor showing on a recall test and make a good showing on a recognition test. The usual examination requires that the student originate the answer. He is to "tell" or "describe" or "explain" something. This is rather exacting. If he is only required to recognize the correct answer or to observe a relationship and apprehend its application, his record may be much better. One may be quite unable to "tell" anything of consequence about the reign of Henry VIII, yet he may be able to recognize and respond correctly to such names as Colet, Anne Boleyn, the English Reformation, or the Public Schools. And after all is not this sufficient for the purposes of additional instruction? What we need in this connection is not necessarily reproducible knowledge but rather knowledge sufficient to give meaning to further reading or discussion. This knowledge is more of the recognition,

than of the recall, type. Accordingly, if our friend, the college professor, gives a test of the essay type where few "cues" are provided and much originating is called for, he may draw quite erroneous conclusions as to the amount of usable knowledge his students possess.

Something other than knowledge of subject-matter must be considered. Our appraisal of past instruction and our chance to build upon it depend upon what a child is, as well as upon what he can remember and reproduce. We should be far more interested in the quality of a child's thinking than in the items of information that stick in his memory. We should be far more concerned with his industry than with his knowledge. His interests mean more than his repertoire of memory material. His attitudes and appreciations are more fundamental than the facts at his immediate command.

Moreover, these appreciations, attitudes, and interests, this industry, and ability to think are precisely the bases upon which truly advanced teaching must rest, for this advanced teaching must not merely duplicate previous teaching. It must be something more and better than has gone before; it must generalize more broadly and analyze with greater penetration. The attitudes it fosters should be more discriminating; the sense of values it engenders should be more vital; the interests it arouses should be more varied and energizing. The measure of the instruction which is truly prerequisite to all this is something more than a catalogue of facts remembered.

There is another fallacy in drawing inferences as to previous instruction from the results of information tests. Few people, no matter how capable or highly trained they may be, can give a good account of themselves in several fields of knowledge. One of the most common types of educational literature exploits the shortcomings of some class of people on the ground that they do not know this or have wrong ideas about that. Anybody can make a test which can be depended upon to "show up" those who take it. Not a few pupils when they enter high school or even college will fail to correct obviously bad English. They may locate Labrador in Asia and San Francisco in South America. They may identify John Marshall as a Puritan or a Revolutionary general. One can get similar results if tests are given to merchants or farmers or stenographers. Vary the tests a little and you can make sport of doctors and lawyers and school teachers. The truth is that a man's readily producible knowledge outside of his special field is small and full of holes. He can be made ridiculous without much effort and, if a large number of men of the same class are included, the task requires no effort at all. If a very large number of college presidents were examined with a cunningly contrived multiple-choice test someone could be found who would say that John Pershing was a pacifist, that Old Crow was a bird, or that the Susquehanna River flows into the Arctic Ocean.

Such findings are inconsequential and the usual inferences from them are naïve. The findings are inconsequential because they are universal, and the inferences are naïve because, having been made so frequently, they have lost their novelty.

We suggest, therefore, that complaints as to poor preliminary teaching and learning be revised. Let the college teacher be interested in finding out how much a student already knows of a given subject rather than what he does not know. Let the teacher bear in mind that recognition has almost as much apperceptive use in further learning as recall. And finally, let it be remembered that knowledge of facts is not the only, nor indeed the most useful, acquisition a student may bring from earlier teaching.

In estimating the value of previous instruction all these points of view must be considered. Our recent literature is full of the idea that we must take account of a pupil's ability. It is equally true that we must take account of the instruction which his teachers have given him.

THE SUPPLY AND DEMAND FOR ENGINEERING GRADUATES

WILLIAM T. MAGRUDER
Professor of Mechanical Engineering
Ohio State University

THE subject of "Supply and Demand" has probably as many angles and problems connected with it in education as in business. To engineering college professors the most intense problem at this season is not whether these graduates will choose wisely from the various positions that are being offered them, but whether they will get into positions which, regardless of how lowly and poorly paid they may be at the start, may lead to suitable places of responsibility and trust, and whether they will enter the employ of companies which can provide them with ladders long enough to reach the greatest heights of engineering achievement and of human happiness to which young engineers can aspire.

The supply of engineering graduates from the Ohio State University has varied from a maximum of 125 in 1913–14 to a minimum of 67 in 1918–19, since the war, the number of engineering degrees conferred went to 237 in 1922–23. In the seventeen years up to and including 1924–25, 2,383 engineering degrees have been conferred by this university, an average of 140 each year.

For the country at large, the last bulletin on the subject by the United States Bureau of Education gives 7,365 as the total number of first degrees in engineering conferred in continental United States in 1921–22, which, with 352 graduate degrees conferred, makes a grand total of 7,717 engineering degrees of all kinds and grades conferred in 1921–22. Figures for the three later years are not yet available. Their numbers have not changed materially and have probably decreased rather than increased. This institution now confers about one thirty-fifth of all the engineering degrees given in the United States.

The total number of baccalaureate degrees conferred in 1921–22, according to the United States Bureau of Education, was 47,854; professional degrees, 12,019; graduate degrees, 7,327; and honorary degrees, 1,082, making a grand total of 68,282. This means that in 1921–22, only one in 8.85 degrees conferred was in engineering.

Now what about the demand? Because of the increasing utility of engineering products for human needs and the corresponding demands for their generation and efficient use, it is evident that there must be a large demand for trained engineers. These men may come from the colleges or along the slower, more laborious routes of practical training received in the industries. The National Industrial Conference Board finds fault with the engineering colleges because they are graduating annually only about eight thousand men, while the industries demand over forty thousand trained workers each year.

Reports for the last three years show that an average of sixty-two organizations have applied directly to the Department of Mechanical Engineering, Ohio State University, asking each year

for the services of 135 men from the graduating class, but the classes have averaged only 47 men. These facts show that three positions are available for almost every graduate.

For the present graduating class in mechanical engineering, we find that fifty-six corporations or companies have applied so far, requesting the services of 113 mechanical engineering students of the class of 1926. As only 36 men are available, the average demand is 3.2 times the supply. Several men have received four or more offers. And yet, there are two months till Commencement Day! Twenty-four of these fifty-six corporations have sent twenty-nine men to interview the members of the graduating class this spring. They have each spent at least one day interviewing students and some have spent two, three, or even four days in this work. Each visitor seeking men has had personal interviews with from a dozen to a score or more senior students. Some companies have had the likely students visit the plants or factories at the expense of the company, spend the day, see the place, and be interviewed by the executives, before they are offered employment. Every effort is apparently being made to prevent mistakes. The practice of employing from one to several hundred college graduates, training them for a year, and then letting half of them go, if it ever did exist, has been found to be bad practice and is no longer followed.

In the other engineering departments of this university, the demand for graduates far exceeds the supply, and it is not unusual for a very promising man to have five opportunities for work. There are few, if any, alumni available. Some men will consent to be moved to better positions that show more outlook for advancement, pleasanter localities, and better opportunities to bring up a family, but the engineer seems to be a contented citizen.

From this it will be seen that the demands for the engineering graduates are far in excess of the supply, and that those who make the demands must content themselves with men trained either in practice or in some other branch of learning. As Horace Greeley once said, "There is plenty of room at the top." But it should not be forgotten that there are plenty of rungs in the ladder at quite a distance from the top, and they are neither crowded with climbers nor uncomfortable. Either the experiences of the engineering colleges are wrong or there is a fallacy in the oft-repeated statement that the colleges are turning out too many men. Industry needs and is asking each year for an increasing number of men of proper training, good judgment for their years, and with a little of that uncommon thing called "common sense."

Now what is the remedy? Evidently industry should be supplied with what it rightfully wants, asks for, and is willing to pay for. If any engineering college should lower its standard, the industries would find it out very quickly and seek elsewhere for the young engineers whose services they desire in order to train them for later responsible and executive positions. It would seem that the principals and teachers of high schools and all persons who have anything to do with the guidance of young men, should try to open the minds of those who have shown a love of mathematics, of the physical sciences, and of accurate English, that a demand for engineering college graduates is far in excess of the supply; that a happy life of service to themselves, their state and nation, and to civilization awaits them, if they have the desired talents and aptitude for any kind of professional engineering work.

It is not for the recent high-school graduate alone that the industries and engineering colleges are asking, but also for young men of strong character, good

physique and health, and not too many domestic responsibilities who have found out that, because of their lack of an engineering education, they have reached the ceiling of their advancement in the kind of work they like, and who desire to "go to school" again at an engineering college. Their earnestness of purpose is a great tonic to the instructors as well as to the younger men of a class. They know why they are there and feel that they must have that for which they came. Almost 80 percent of the present junior class in the College of Engineering are partly self-supporting and 25 percent are entirely so; 50 percent partly support themselves during the college year. Thus it will be seen that an education is obtainable by any man who is mentally and physically able and is willing to work for it. It is the duty of those who have the interests of our young men at heart to encourage and help them to supply the demands of the engineering industries and so better themselves and advance civilization.

HOW A TEACHER'S SUBJECTS INFLUENCE HIS PROBLEMS

HARLAN C. KOCH
Ohio State University

WE shall attempt to show in the course of this article how a teacher's subjects affect the character of his problems. The accompanying table is basic to our discussion. It represents the distribution of some three thousand problems among eight subjects. These problems were submitted by 301 teachers in the course of a recent investigation.[1] They represent approximately three-fourths of all the problems submitted by 676 teachers for the study as a whole.

Before proceeding with the discussion of Table I, let us explain the method of presenting the data. It will be noted that the problems are distributed on the basis of 1,000 per subject. Such a treatment makes the subjects comparable and simplifies them. The data may now be read as "so many problems of a thousand" rather than as so many of a stated number of problems—each stated number differing with a different classification.

What, then, are the salient facts of Table I? Where shall we look for distinctive problem differences? It is evident that if we would discover such differences, we must confine our attention to those problems which reflect the characteristics of the individual subjects.

PROBLEMS IN COMMON

On the one hand, inquiries related to such topics as physical conditions, the management of the pupil, extra-curricular activities, the arrangement of classes, special rooms, and the teaching force do not do this. They may, therefore, be said to represent problems common to the teachers of all subjects. For purposes of exactness, however, we must state that physical conditions play a large part in the teaching of those subjects which require laboratory accommodations, such as the natural sciences, home economics, and the industrial subjects. The character of the inquiries submitted by these teachers indicates this. For instance, they mention the effect upon their work of the absence of seemingly indispensable major equipment, overcrowding in the laboratory, the inaccessibility of permanently attached units of equipment, and so on. Here is a typical problem: "What am I to do with forty pupils in a science

[1] This is the third report of Project 60, Problems in high-school administration and supervision which have their origin in the classroom.

laboratory which was designed to accommodate thirty?"

The teachers of the other subjects likewise mention such universal needs as maps, charts, textbooks, janitorial service, heating, lighting, ventilation, and such other matters as a poorly planned building which places, say, a foreign-language class too near the gymnasium or the school shops.

WHERE DIFFERENCES DO OCCUR

On the other hand, four topics do show the effect of a teacher's subjects upon his problems. These are: the course of study (column 4), the curriculum (column 11), the recitation (column 12), and the pupil (column 13).

TABLE I. TOPICAL DISTRIBUTION OF PROBLEMS ON THE BASIS OF 1,000 PER SUBJECT

SUBJECT	TEACHERS REPORTING	NUMBER OF PROBLEMS	SCHOOL AND CLASSROOM MANAGEMENT				SCHOOL ORGANIZATION				METHOD	
			Course of Study	Physical Condition	Pupil	Extra-Curricular Activities	Arrangement of Classes	Special Rooms	Teaching Force	Curriculum	Recitation	Pupil
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Commerce	31	283	49	65	423	39	43	17	130	18	113	103
English	52	742	58	31	356	56	28	39	99	13	171	149
Home economics	26	175	103	96	297	63	40	166	40	6	120	69
Industrial subjects	24	164	127	67	317	18	55	165	98	.....	36	117
Languages	37	367	44	16	425	39	26	22	88	5	188	127
Mathematics	47	412	70	19	432	54	17	38	109	12	144	105
Science	40	521	106	84	315	25	31	96	90	7	130	116
Social science	44	326	52	64	333	67	22	43	107	.....	187	125
Total	301	2,990	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

THE COURSE OF STUDY

One naturally expects the course of study to reflect the nature of the subject for which it was devised. That is to say, the problems which originate in the course of study deal with matters peculiar to the subject in question. We shall illustrate this with sample problems selected from two of the eight subjects in column 1, the industrial subjects and science.

Industrial subjects.—Looking down the column of the course of study (column 4) we find that the teachers of the industrial subjects have submitted the largest number of problems. These teachers are troubled most, so their inquiries show, by three classes of difficulties. The first has to do with the division of time among different activities, as for instance, "How can we best divide our time between book work and shop?" The second, which deals with the content of the course, is characterized by problems of this type, "Should isometric drawing be included in a two-year course of study?" and "What is the best course that can be given to a junior and senior vocational class in tool and machine drawing?" Finally, the frequency with which vocational teachers ask questions about making their work practical and matter-of-fact reveals that they are anxious to establish vocational processes upon correct principles. One can sense how difficult this must be when he reads the terse inquiry, "What shall I say to my boys in agriculture when they make the rejoinder that things are not done that way on the farm?"

Science.—We see that in point of the number of questions asked, the science course of study is quite on a par with the industrial subjects. One hundred and six problems are listed for science, and 127 for the industrial subjects. A state of turbulence peculiar to new subjects, cannot account for the high frequency of problems, for science is one of the oldest subjects now taught. There is internal evidence that the answer may lie in science as a changing field. In corroboration we mention the striking fact that the teachers have confined their inquiries concerning the course of study almost wholly to such topics as the allocation of time to different activities, the organization of subject-matter, the selection and use of supplementary material, and the ground to be covered by the course of study. Not one teacher mentions the practical aspects of the work. Aims and objectives trouble them scarcely at all. But how to encompass this amazingly unstable field, whose advances are so rapid as to make new discoveries old before they appear in print, is the knottiest problem of all.

Even a stronger indication of the truth of these statements lies in the frequency with which the science teachers have indicated a desire for modern textbooks. One-third of all the inquiries concerning physical conditions (column 5) reflects such a need. For instance, one teacher expresses himself as follows: "If we could be supplied with new textbooks in science one of our sorest needs would have been met." When one considers the usual variety of equipment demanded in science courses, this emphasis upon textbooks becomes significant of the changing field of science.

THE CURRICULUM

In problems appertaining to the curriculum (column 11) the teachers adhere rather strictly to matters related to their particular subjects. In this fashion, teachers of English speak of the desirability of expanding or contracting the number of English courses offered, or of making substitutions for some of them; science teachers deal similarly with science; commerce teachers with commerce; and so forth. Let us illustrate this tendency. Here is an inquiry submitted by a teacher of English. He says, "Should formal grammar have a place among the high-school subjects?" and a teacher of science asks, "To what extent should elementary organic chemistry be taught in high school?"

Speaking parenthetically, an inspection of the relative frequencies of problems in column 11 leads one to conclude that teachers are not greatly concerned with problems of the curriculum. The causes for this evident apathy the reader must conjecture. Nothing in our data will account for it.[1]

Much that we have said concerning the curriculum as a field in which innate differences demarcate the various subjects holds good for the next two topics as well. We refer to the two subsumptions under method in Table I: the recitation (column 12) and the pupil (column 13). These two aspects of a teacher's work present the most clean-cut differences of all.

METHOD: THE RECITATION

Evidence at hand shows that teachers desire a common knowledge of such matters as making the assignment, the general mechanics of the recitation, lesson plans, pupil participation and preparation, the art of questioning, and reviews and drills. But when effective methods of developing the lesson are the issue, the problems immediately reflect the subject-identity of the teacher.

For instance, teachers of science want to know how best to present such topics as Newton's Second Law of Motion,

[1] In this connection see Buckingham, B. R., *Research for Teachers*. Chicago: Silver, Burdett and Company, 1926. p. 2.

Boyle's Law, the parallelogram of forces, the principle of Archimedes, the composition and resolution of forces, and other typical problems. In English, teachers puzzle over the best methods of teaching sentence structure, punctuation, case, gerunds, participles, or oral composition.

We now see that, as science and English differ in character, so do the problems of their respective methods differ. This is equally true of the other subjects.

METHOD: THE PUPIL

The pupil (column 13) is a close second to the recitation as a source of distinctive differences. These differences are found in connection with the first of three general classes of problems. These classes are how to develop the powers and appreciations of the pupil, how motivate him, and how help him to establish such correct educational habits as being attentive in class, exercising care in the use of English, taking pains with his written work, and on through a considerable list of similar items.

As evidence of the fact that the problem of developing the powers and appreciations of pupils changes in character from subject to subject, we submit the following problems:

Will a child derive more pleasure and profit from a course of reading in which he pursues the kind of material he especially likes, or will it be more worth while to force him to read other types in the hope of creating a new interest?

Another teacher of English says, "Pupils are very much inclined to be surface-skimmers. They do not thoroughly master things." A teacher of Spanish asks, "How can I teach pupils to think in a foreign language?" A Latin teacher says, "pupils cannot apply the rules of Latin," and a teacher of physics submits a similar problem when he inquires, "How may pupils be taught to apply the laws of physics in the solving of problems?" Finally, a teacher of mathematics with fifteen years of experience, reported this difficulty: "Pupils seem to be unable to think in terms of symbols or principles."

From such problems one gathers that a certain technique is demanded by one subject that is not demanded by another. This is a critical point in the teaching of certain subjects and forms the basis of special psychological procedures and supervisory processes.

A perusal of the material submitted by the teachers in connection with motivating the pupil and helping him to establish correct educational habits reveals few difficulties that are peculiar to any subject. In support of this statement we set down here four problems in the teachers' own words:

"My pupils are continually worrying about having to do extra work" (a teacher of algebra).

"What is to be done with students who take no interest in their work and are in school only until they can secure a working certificate?" (a teacher of chemistry).

"What would you do with a pupil who prepares his work carelessly?" (a teacher of Latin).

"How can I impress the fact upon the class that geometry is a worthwhile subject?" (The reader may substitute the name of any other subject in the curriculum, for this question occurs many times).

So it is a fairly safe generalization to say that the sluggish, indifferent pupil reacts true to form in every subject. Here and there chance circumstance may pierce the armor of this sort of fellow, but to create and sustain a general pride in accomplishment is a stern problem of a different character.

SUMMARY

As revealed by the subjects which instructors teach, problems of the classroom fall into two distinct categories. The first of these includes those problems which are common to all teachers. These are grouped about such topics as physical conditions, pupil control, the administration and supervision of extra-curricular activities, the arrangement of classes, the management of special rooms, and the relations of the teaching staff.

The second is the category of problems peculiar to the subjects taught. The problems which are related to such topics as the course of study, the curriculum, methods of conducting the recitation, and methods of awakening the powers and appreciations of the pupils—all of these reflect the character of the subjects with which they are identified. Since this is true, they are not common to all teachers, but imply the need of training in special knowledges and techniques.

No mention has been made in this article of the practical value of a knowledge of how teachers' problems "break." It is evident at a glance, however, that such a knowledge is potentially valuable to teacher-training institutions, to school administrators, and to the teachers themselves.

IN the editorial section of the April number of the *Educational Review* is told in brief, the story of a unique enterprise conducted during the past year in the Chicago public schools. Thirty children selected by lot from the highest grade of thirty different elementary schools were brought together for a series of tests devised by laymen. It was not an exhibition since the audience was composed of elementary-school principals. It was designed as an attempt on the part of the school people to see what the products of their schools were on the basis of desirable objectives as set forth by men and women not engaged in school work.

The Woman's City Club, the Men's City Club, the Union League Club, the Association of Commerce, and the Chicago Post Office, each sent an appraiser to pronounce upon the quality of work done. The representatives of these organizations set up the following standards for the public-school graduate:

1. To have clean clothes, clean teeth, clean hair, and clean skin.
2. To be able to select and discuss the essentials of a speech.
3. To be able to find in the dictionary the pronunciation and meaning of a group of words and use them properly in a sentence.
4. To be able when acting as host or hostess to introduce lady or gentlemen guests.
5. To find a list of names in the city telephone directory and record the telephone numbers.
6. To write a letter legibly, easily, and with handsomely formed letters.
7. To use a card catalogue in the library and follow the trail.
8. To demonstrate valuable social judgment by rating the estimates of good citizenship of a number of individuals for each of whom specific illustrations of civic reaction were given.

Tests in drawing, music, and art were also included. The whole effort was to set up tests for socially worthwhile educational objectives and without coaching to ascertain how well the child ready to leave the elementary school had attained these objectives. Any school would do well indeed to measure its output by such standards. Such a program properly carried out and reported would greatly increase the interest of any community in its school system.

Over one hundred students and parents representing the high schools of Fairfield County attended the third annual banquet held in Lancaster. This is one of the high-school activities participated in by twelve different high schools that were arranged and given by the County High-School Student Council. This organization is fostering a county-wide musical program this year. These activities are truly educational as they train the high-school youth to accept and discharge responsibilities in carrying out actual life situations.

EDUCATIONAL READINGS

MORRISON, J. CAYCE. *The Value of Carefully Defined Rules and Regulations Covering the Work of the School Board and the Superintendent*, *ASBJ*, 72:48-50, February, 1926.

If printed regulations governing school board procedure are prepared as a statement of principles governing a service that may change and grow to suit new times, Dr. Morrison advises their adoption. After a study of sets of rules furnished him by school boards of twenty Illinois cities, he concludes that the five underlying problems to be solved by the formulation of such rules are: (1) What service shall be rendered? (2) What individual responsibility shall be fixed? (3) What overlapping of authority can be available? (4) What teacher experience can illuminate new problems? (5) What allowances can be provided for a possible change in conditions? The adjustments of the board's relationship to various school problems that can be made through a carefully defined set of regulations are illustrated.

SEYBOLDT, ROBERT F. *The S. P. G. Myth: A Note on Education in Colonial New York*, *JER*, 13:129-37, February, 1926.

The frequently repeated assertion that the English schools in the Province of New York from 1700 to the time of the Declaration of Independence were maintained by the religious society, the Society for the Propagation of the Gospel in Foreign Parts, organized under the auspices of the Church of England, is disproved by this article. Mr. Seyboldt gives in his article the names of two hundred teachers of English schools with the dates of service and the villages in which they worked.

WILLING, MATTHEW H. *Individual Diagnosis in Written Composition*, *JER*, 13:77-89, February, 1926.

Opening his article with the question, "How shall a teacher of beginning high-school English find out economically, comprehensively, and accurately what instruction and training each of his pupils needs in the formal elements of written composition?" the author describes three tests, an original composition on an exciting experience, a reproduction of an anecdote, and the correction of a long theme. This article reports the scores of the 66 pupils in the classes who took two forms of the three tests, the first form in October, the second, in December. Comparing the three tests he finds "so far as economy, comprehensiveness, and reliability are concerned" the correction of error test used in this study is a far better instrument for revealing individual weaknesses in proofreading than in a single original or reproductive composition for revealing weaknesses in the formal elements of composition. From tentative manipulation of data the author finds evidence of a substantial correlation between ability to write accurately and the ability to correct errors.

ROBBINS, C. L. *Teachers' Contracts: Some Social Considerations*, *ASBJ*, 72:43-44, April, 1926.

Few if any of the teachers' contracts now in use are satisfactory. The author has made an analysis of seventy-six contracts from forty-six different states which shows many absurdities in present usage.

In concluding his article, Mr. Robbins says, "The teachers' contract should not be a résumé of local by-laws, a digest of state school laws, a lecture on the ethics of the teaching profession, nor a summary of local prejudices. On the contrary, it should be a brief statement of agreement concerning a few items such as the following: (1) time of employment, (2) salary and method of payment, (3) the conditions under which the contract may be terminated. If additional items are included they should be of such a nature as to give the teacher a feeling of confidence in the school authorities, a desire to render excellent service, and an ambition to improve."

GATES, ARTHUR I., assisted by BATCHELDER, MILDRED I. and BETZNER, JEAN. *A Modern Systematic vs. Opportunistic Method of Teaching*, *TCR*, 27:679-700, April, 1926.

A carefully controlled experiment conducted in the Horace Mann School Teachers College during the school year 1923-24 is here reported. The study was designed to disclose the outcomes in the form of significant information, skills, habits, and attitudes of a year of school work carried on in one group by a modern systematic method and in another by what is called an "opportunistic" method. So far as objectives of education outside of the traditional scholastic subjects are concerned, the methods produced substantially equal results. Opportunistic teaching resulted in slightly higher achievements in writing and drawing. Considerably greater achievement in arithmetic, spelling, and silent and oral reading was secured by the modern systematic teaching.

FINLEY, CHARLES W. *The Training of Science Teachers*, *TCR*, 27:701-06, April, 1926.

The author enlivens his article with verbatim extracts from many notable writers who have been heard in the long-standing controversy between "academically minded" and "professionally

NOTE.—The abbreviations used in this number are: *ASBJ*, American School Board Journal; *JER*, Journal of Educational Research; *TCR*, Teachers College Record; and *JEP*, Journal of Educational Psychology.

minded" educators. He ably pleads for a combination of both; for, says he, "the question of teacher training for our secondary science teachers is not one of subject-matter *or* professional training, but is one of subject-matter *with* professional training."

LEWIS, E. E. *Arguments and Principles Favoring the Single Salary Schedule*, *ASBJ*, 72:49–50, April, 1926.

One of the most significant developments concerning the payment of teachers is the idea of a single salary schedule. Dr. Lewis has summarized the argument in favor of such a schedule as follows: (1) The work of one classroom teacher of given attainments is as valuable as the work of another teacher of equal attainments. (2) A single salary schedule permits the transfer of teachers without financial loss. (3) It dignifies elementary education and the position of the elementary-school teacher. (4) It is easier to operate because the budget can be predicted in advance. (5) It tends to eliminate blocs among classroom teachers. (6) It generally has a higher maximum and therefore emphasizes higher standards of professional attainment, study, and growth. (7) It is simply justice to pay in accordance with merit, training, and experience. (8) It practically eliminates politics of the "spoils" variety. (9) It forms a basis for the invention of salary schedules for other groups of personnel.

MAY, MARK A., AND HARTSHORNE, HUGH. *First Steps Toward a Scale for Measuring Attitudes*, *JEP*, 17:145-62, March, 1926.

These two investigators for the Character Education Inquiry which is being conducted by the Institute of Educational Research, Teachers College, Columbia University, have set down in this article the tenets which are guiding them in the construction of an attitude test. The particular behavior tendency selected for measurement is dishonesty. The authors assume for purposes of measurement that dishonesty is analogous to a particular form of energy such as heat, and that it is to be measured by the amount of work done, that is, by the dishonest acts performed. They feel, however, that unless it is possible to get down to the basic dynamic factors which underlie attitudes, it is doubtful whether such scales as are here proposed can ever be as universal as the intelligence scales.

SYMONDS, PERCIVAL M. *Study Habits of High-School Pupils*, *TCR*, 27:713–24, April, 1926.

The conclusions reached in the investigation of which this article is a report are extremely interesting. "Until one sits down and watches boys study," says the author, "one does not realize how simple a process study is for ninth-grade boys. In general, they do precisely what they are told and no more; and, in general, they are told to do only very simple things." Good students and poor students are not totally different in their habits. Good students are a little more industrious, a little more skillful in handling materials, and a little more clever in attacking a problem. Good students tend to be alike in habits that relate to study; whereas there is no type of poor student. Since high-school boys do only what is required of them, the burden comes squarely back upon the teacher. In the assignment is the key to study habits.

IN PAPER COVERS

ODELL, CHARLES W. *The Assignment of Lessons*. Urbana, University of Illinois, (University of Illinois Bulletin, Vol. XXIII, No. 7. Educational Research Circular, No. 38)

Gathered from a variety of sources the author summarizes a discussion of the lesson assignment. Such topics are taken up as: when to make the assignment, planning the assignment, motivating pupils' study, and the purpose of the assignment.

Report of the School Survey and Educational Program for Fort Lupton, Colorado, School Year 1924–25. Colorado, Colorado State Teachers College, 1924–25. 97 pp. (Colorado State Teachers College Bulletin, No. 3)

This survey directed by Dr. H. S. Ganders of the Colorado State Teachers College is especially notable for the manner in which under each of the various subheads are set forth the findings and the recommended program.

Providence Public School Bulletin. Providence, Rhode Island, Board of Education, 1926. 32 pp.

This publication is to be a quarterly magazine devoted to the interests of the public schools of that city and includes mostly short paragraphs discussing certain features of the school work and the problems and projects of the school. The last page presents in diagram the organization of the local system.

WHIPPLE, GUY M. AND DAVIS, HELEN. *Problems in Mental Testing*. Bloomington, Illinois, Public School Publishing Company, 1925. (Pages unnumbered) (Educational Problem Series, No. 9)

The general form and organization of this set of problems resemble the former numbers of the series. The problems are presented at the head of each page, questions bearing upon the problems are given at the foot of the page, and references which will throw light on the difficulty are added. A blank space is allowed on each page for the students to suggest a solution of the problem. *Problems in Mental Testing* presents a comprehensive group of interesting test problems.

HOLT, FRANK O. AND FOWLER, JOHN GUY. *School Bonded Indebtedness in Nineteen Wisconsin Cities.* Madison, University of Wisconsin, 1925. 60 pp. (Bureau of Educational Research Bulletin, No. 5)

This bulletin reports a study of the financial conditions of these cities in respect to their ability to finance public education, of bonded debt in relation to finance, and of the cost of public education in these cities.

BOOKS TO READ

BUCKINGHAM, B. R. *Research for Teachers.* Chicago, Silver, Burdett and Company, 1926. 380 pp.

Progress in research in education has been steadily gaining momentum during the past two decades. For some time the feeling was general that such work could be done only by persons of much training and that teachers probably could neither do it nor learn it. More recently it has been recognized that if educational research is to function in changed schoolroom practice, the teachers hold the key position both for research and for the application of the findings.

Dr. Buckingham in this book has recognized this fact and has written directly for the classroom teacher. He has brought together in understandable form some of the things we know about learning, the statistics which a teacher needs to know for elementary research, and discusses intelligence tests, educational tests, new type examinations, grouping and classifying pupils, and other problems which are in the focus of attention in terms of present-day situations. It is evident as one reads the book at any point that the writer has not only had intimate personal acquaintance with teachers and classroom conditions but that he still knows these although long removed from personal supervisory relationship. It is written in an intimate personal style which makes one feel that he is having a conference with the author. The chapters are summarized and followed by a selected bibliography which makes the book exceptionably usable for reading circles and study centers. The final chapter, "The Teacher as a Research Worker," should challenge any teacher to undertake at least something in the spirit of modern research.

PRESSEY, L. C. AND PRESSEY, S. L. *Methods of Handling Test Scores.* Yonkers-on-Hudson, New York, World Book Company, 1926. 60 pp.

This little book should prove a useful aid to busy teachers who desire to acquaint themselves with statistical methods in educational measurements. It presents briefly and simply the few elementary statistical procedures which every teacher should know. Exercises for practice are included.

LENTZ, THEODORE F. *An Experimental Method for the Discovery and Development of Test of Character.* New York, Teachers College, Columbia University, 1925. 47 pp. (Teachers College, Columbia University, Contributions to Education, No. 180)

This monograph describes a method of attack rather than a finished piece of research. The author insists that concrete life situations be used as the criteria of character traits, that all variables other than the traits being measured should be eliminated or under control, and that the validity of any test should be determined by its use with several groups rather than stating its evaluations in terms of the original group to which it was given.

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PRACTICE AND STUDY MATERIALS

AN interesting development has been indicated by recent publications that is supplying the pupils with practice materials which are to be used to supplement the regular test. Up to the present time the majority of these practice materials have been prepared for the elementary grades. It is undoubtedly true that the high-school pupil who has had experience in studying for himself may also be helped to a large degree by similar materials.

Three interesting publications have appeared, one dealing with practice tests in geography by Dr. M. E. Brannom is published by the Macmillan Company. The practice tests are bound into a substantial tablet, one of which is to be the personal property of each pupil. While studying a given section of a country the pupil is asked to answer a large number of questions which include place geography, the application of geographical principles, questions dealing with commerce, industry, and other important matters relating to human geography. Objective means have been employed for scoring of these tests. For example, some of the exercises are as follows: (1) Which state leads in the fishing industry? (2) True and false exercises such as, Tobacco is a special crop of Merrimac Valley. (3) Map exercises where the location of a city

or river is indicated by a number. (4) Matching tests which involve placing the number of a product before a given city or state. (5) Completion exercises as, Most of the copper mined in these states comes from the state of————. Other exercises which are included involve the construction of maps, cause and effect relations, and the like.

Another set of exercises has been developed in arithmetic. *An Arithmetic Work-Book for Grade IV* has just been published by Scott, Foresman and Company. This book has been written under the joint authorship of Doctors G. M. Ruch, F. B. Knight, and J. W. Studebaker. Similar work-books have also been developed for grades V and VI.

The work-book for grade IV contains much helpful material and many aids for the pupil. A large amount of the pupil's work is written in the booklet which means that each pupil must have his own copy. Carefully constructed drill exercises and tests are included. The readers will obtain some idea of the book by noting the contents of one lesson. Lesson 1 includes the following headings: (1) Things to watch in addition, (2) Practice in column addition, (3) Things to watch in subtraction, (4) Practice in subtraction, (5) Things to watch in multiplication, (6) Practice in multiplication, (7) Multiplying by 10, 20, 30, etc., (8) Practice in multiplying by 10, 20, 30, etc.

Materials for reading in the elementary grades have also been provided by Dr. W. A. McCall and Lelah Mae Crabbs. Two booklets have been published, one for the third grade and the other for the fourth grade. The materials are called *Standard Test Lessons in Reading for Grades III and IV*. These are published by Teachers College, Columbia University. Some of the purposes of these test lessons are: (1) to teach pupils how to comprehend rapidly all kinds of reading materials, (2) to help them enjoy their reading lessons, (3) to make it easier for them to learn other lessons, (4) automatically to indicate their proper grade classification in reading, (5) to motivate and improve their oral expression, (6) to prevent the dull pupils from becoming discouraged, and the bright pupils from loafing, and (7) to save pupils' time.

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GROWTH OF OHIO HIGH SCHOOLS

THE following data taken from *Ohio School Reports* show the tremendous growth in the high-school enrollment and the number of teachers employed for high-school service in Ohio from 1855 to 1924. It should be noted that the data are tabulated by five-year intervals to 1920 and annually since that date. According to the 1924 report 18 percent of the entire public-school enrollment was in the secondary school (grades IX-XII).

TABLE I. NUMBER OF PUPILS ENROLLED AND TEACHERS EMPLOYED IN OHIO HIGH SCHOOLS FROM 1855–1924

YEAR	NUMBER PUPILS	NUMBER TEACHERS	PERCENT INCREASE TAKING 1870 AS 100 PERCENT	
			Pupils	Teachers
1855.....	7,522	196	.....	.....
1860.....	13,183	319	.....	.....
1865.....	9,114	227	.....	.....
1870.....	18,828	442	.....	.....
1875.....	24,212	641	29	45
1880.....	30,111	698	60	58
1885.....	32,574	901	73	104
1890.....	36,492	992	94	124
1895.....	48,360	1,301	157	194
1900.....	57,052	1,987	203	346
1905.....	60,748	2,480	223	461
1910.....	75,381	3,597	300	714
1915.....	103,676	4,723	451	969
1920.....	128,588	5,988	583	1,255
1921.....	153,881	.....	717	.....
1922.....	178,705	7,852	902	1,677
1923.....	206,090	8,481	993	1,819
1924.....	212,712	9,114	1,030	1,962